

# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference <b>SK/FI982737</b>	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. <b>PCT/FI99/01056</b>	International filing date (day/month/year) <b>17/12/1999</b>	Priority date (day/month/year) <b>17/12/1998</b>
International Patent Classification (IPC) or national classification and IPC <b>B03B9/06</b>		
Applicant <b>VALMET CORPORATION et al.</b>		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 9 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 10 sheets.

3. This report contains indications relating to the following items:

- I    ☒ Basis of the report
- II   ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV   ☐ Lack of unity of invention
- V    ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI   ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand  <b>14/07/2000</b>	Date of completion of this report  <b>23.04.2001</b>
Name and mailing address of the international preliminary examining authority:  <div style="display: flex; align-items: center;"> <div>             European Patent Office              D-80298 Munich              Tel. +49 89 2399 - 0   Tx: 523656 epmu d              Fax: +49 89 2399 - 4465           </div> </div>	Authorized officer  <b>Fritsch, K</b>  Telephone No. +49 89 2399 7318



**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/FI99/01056

**I. Basis of the report**

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

**Description, pages:**

1-18,22,23	as originally filed		
19-21	as received on	29/01/2000	with letter of 26/01/2000

**Claims, No.:**

1-33	as received on	29/12/2000	with letter of 12/12/2000
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**Drawings, sheets:**

1/2	as originally filed		
2/2	as received on	29/01/2000	with letter of 26/01/2000

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/FI99/01056

4. The amendments have resulted in the cancellation of:

- ☐ the description,      pages:
- ☐ the claims,      Nos.:
- ☐ the drawings,      sheets:

5. ☒ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

**see separate sheet**

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes:	Claims 1 - 19
	No:	Claims 20 - 26
Inventive step (IS)	Yes:	Claims
	No:	Claims 1 - 19, 27 - 33
Industrial applicability (IA)	Yes:	Claims 1 - 33
	No:	Claims

2. Citations and explanations

**see separate sheet**

**VII. Certain defects in the international application**

The following defects in the form or contents of the international application have been noted:

**see separate sheet**

**VIII. Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

**see separate sheet**

**Item I:**

1. The applicant has deleted the following feature in claim 1:  
'a residual fraction (31) from the screening stage is used as fuel in the production of energy'

This feature is presented as essential in the disclosure of the invention as such for the function of the invention in the light of the technical problem which it seeks to solve. The deletion of this feature requires modification of other features to compensate for this deletion.

In effect the formulation of new claim 1 does not say explicitly that in the first stream (1) after the screening stage (30) a residual fraction (31) is used as fuel in the production of energy.

The deletion of this feature introduces subject-matter which extends beyond the content of the application as filed, contrary to Article 19(2)/Article 34(2)(b) PCT.

2. The applicant has deleted the following feature in claim 20: 'a energy production unit'

This feature is presented as essential in the disclosure of the invention as such for the function of the invention in the light of the technical problem which it seeks to solve. The deletion of this feature requires modification of other features to compensate for this deletion.

In effect the formulation of new claim 20 does not say explicitly that a energy production unit is part of the disclosure.

The deletion of this feature introduces subject-matter which extends beyond the content of the application as filed, contrary to Article 19(2)/Article 34(2)(b) PCT.

**Item V:**

1. Reference is made to the following documents:

D1: GB 2 026 019 A  
D2: GB 1 364 474 A  
D3: US 3 765 921 A  
D4: WO 95 12549 A1

2. Document D1, which is considered to represent the most relevant state of the art, discloses (cf. Fig. 1) a method of arranging the raw material, energy and waste management of a production plant manufacturing pulp and/or paper and/or board from recycled fibres, which plant receives and processes two separate streams (coming from the refuse sorting installation) of waste material produced by a residential community, both of which are presorted (by the refuse sorting installation) so that the first stream of waste material mainly contains combustible waste (residual fraction) to be used as fuel in the production of energy (current produced by pyrolysis) required by the production plant and the second stream of waste material mainly contains waste paper to be used as fibre raw material of the production plant to a considerable extent, said second stream being passed to a pulping stage (part of the production of fibrous material), to a cleaning (part of the production of fibrous material) and screening stage (part of the production of fibrous material) and to a fibre processing line (page 1, line 70 - 75) comprising at least two of the stages of fractionating, deinking, bleaching, pulp drying and papermaking, and rejects (slops) from at least one of the fibre processing stages are used as fuel in the production of energy, from which the subject-matter of claim 1 differs in that

(i) the first stream of waste material is first passed to a screening stage in which a residual paper- and board-rich fraction is separated from it to be passed to the pulping stage where it is processed either together with the second stream of waste material or separately from it to be used as fibre raw material in the manufacture of pulp, paper or board.

The subject-matter of claim 1 is therefore novel (Article 33(2) PCT).

As the separately collection of waste paper and board is well known since years it is obvious for a person skilled in the art that a plant will receive two separate

streams, one mainly with combustible waste and the other mainly with waste paper and board.

The person skilled in the art would then pass the paper waste directly to the pulping stage and use for the combustible waste the method known from document D1. In this case the screening stage of the current application would correspond to the 'refuse sorting' of document D1 and D1 discloses than D1 discloses all the features of present invention as described above.

The subject-matter of claim 1 is therefore not inventive (Article 33(3) PCT).

3. The features of claims 2 and 3, that waste fractions produced as by-products in the production processes of the production plant, are utilized within the production plant either as energy to a considerable extent and that wastes generated in the manufacture of paper are passed to the production of energy to serve as fuel, are also known from document D1.

The subject-matter of claims 2 and 3 is therefore not inventive (Article 33(3) PCT).

It has to be remarked that in the process of D1, deinking and pulping are necessary and general known production steps in the recycling of paper waste.

4. In claims 4 - 7 slight changes in the method of claim 1 are defined which come within the scope of the customary practice followed by persons skilled in the art, especially as the advantages thus achieved can readily be foreseen. Consequently, the subject-matter of claims 4 - 7 also lack an inventive step.
5. The features of claims 8 - 11 are known from document D3. The subject-matter of claims 8 - 11 are therefore not inventive (Article 33(3) PCT).
6. The features of claim 12 are known from document D2 (wet venturi scrubber, 151). The subject-matter of claim 12 is therefore not inventive (Article 33(3) PCT).
7. The features of claims 13 and 14 are also known from document D1. The subject-matter of claims 13 and 14 are therefore not inventive (Article 33(3) PCT).

PCT).

8. The features of claim 15 - 19 are known from document D4. The subject-matter of claims 15 - 19 are therefore not inventive (Article 33(3) PCT).
9. Document D1, which is considered to represent the most relevant state of the art, discloses (cf. Fig 1) a production plant manufacturing fibrous material, which plant is arranged to use waste materials (Refuse input in Fig. 1) as fibre raw material and as fuel and which plant comprises equipment for processing two presorted and/or separately collected (the separately collection is well known) streams (refuse input and paper fraction) of waste material obtained from an adjacent residential community, the first stream (refuse input) mainly containing combustible waste and the second stream (presorted or separately collected residual fraction) mainly containing waste paper and/or board, which equipment comprise devices (pyrolysis) for utilizing the first stream (residual fraction) of waste material as fuel in the production of energy (current coming from the pyrolysis) for at least the production plant's own requirements, devices (production of fibrous material) for pulping, cleaning and screening the second stream of waste material as well as a fibre processing line comprising devices (page 1, lines 70 - 75)) for carrying out at least two of the processes of fractionating, deinking, bleaching, pulp drying and papermaking, including all the features of claim 20 that
  - (i) the devices for processing the first stream (refuse input) of waste material further comprise a separating device (refuse sorting installation) to which the first stream (refuse input) of waste material is first passed for separating a paper- and board-rich fraction from the combustible waste, said paper- and board-rich fraction being passed to devices (production of fibrous material) for processing the second stream (paper fraction) of waste material to be used as fibre raw material.

The subject-matter of claim 20 is therefore not novel (Article 33(2) PCT).

10. The features of claims 21 - 26 and 33 are also disclosed in document D1. The subject-matter of claims 21 - 26 and 33 is therefore not novel (Article 33(2) PCT).

11. The features of claims 27 - 29 are known from document D3. The subject-matter of claims 27 - 29 are therefore not inventive (Article 33(3) PCT).
12. The features of claims 30 - 32 are known from document D4. The subject-matter of claims 30 - 32 are therefore not inventive (Article 33(3) PCT).

**Item VII:**

1. Although claim 20 is drafted in the two-part form the feature (i) (see point 9 of Item V) is incorrectly placed in the characterising portion, as it is disclosed in document D1 in combination with the features placed in the preamble (Rule 6.3(b) PCT).
2. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D1 - D4 is not mentioned in the description, nor are these documents identified therein.

**Item VIII:**

1. Claims 1, 2, 20 and 21 do not meet the requirements of Article 6 PCT in that the matter for which protection is sought is not clearly defined. The following functional statements do not enable the skilled person to determine which technical features are necessary to perform the stated functions:

Claim 1: '... and rejects (36,40,4) from at least one of the fibre processing stages (34, 37, 47) are used as fuel in the production of energy.'

Claim 2: '... such as rejects and sludges (4, 6, 36, 40) produced in the fibre processing stages'  
and similar for claim 20 and 21.

It is not clear from which fibre processing stages, rejects are used within the production plant, as they are only cited by reference signs. The multiple reference signs for these terms do not specify the different steps or entities.

Further the multiple use of reference signs in claims 20 and 21 renders unclear



**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/FI99/01056

which devices (34, 37, 47) or rejects and sludges (4, 6, 36, 40) are part of the disclosure.

The bulk of product gas 44 obtained from the gasifier 32 is passed to a power plant 45, which is thereby capable of producing in a profitable manner all electrical energy 7 needed in the production plant and, in addition, a considerable amount of energy 8 for sale.

5

The amount of ash 9 generated in the process is about 30,000 t/a. The sensible applications of this fraction may include, for example, the use as a road-bed, in the cement industry or even as a paper filler after a certain further processing. When the gasification reactor is supplied with only paper-based fuels, its ash is particularly  
10 suitable for recycling.

Fig. 3 depicts a two-line production plant which produces about 100,000 t/a of board 20b used as raw material for corrugated board boxes, 100,000 t/a of newsprint 20a as well as a considerable amount of energy 8 for sale, i.e. about 160 GWh/a of  
15 electricity and 560 GWh/a of district heat. As raw material, the production plant uses about 80,000 t/a of used newsprint and magazine paper 10a, about 50,000 t/a of used corrugated board boxes and 30,000 t/a mixed waste paper 10b as well as about 400,000 t/a of REF, i.e. sorted combustible waste 1.

20 The treatment of the REF fraction 1 largely corresponds to the above description in connection with Fig. 2. The REF fraction 1 is separated as dry into two components, i.e. a fraction 31 which is rich in wood and which is passed directly to a gasifier 32, and a plastic- and paper-containing fraction 33 which is pulped together with the mixed waste paper and board fractions 10b. In the pulping station 34, plastics and  
25 other impurities are separated as a reject 36, which is passed through a sludge press 41 to the gasifier 32.

The accepts from the pulping stations 34, i.e. pulped newsprint and magazine paper 35a as well as pulped mixed waste paper, board and a REF-derived fraction 35b are  
30 passed further to cleaning stages 37, which include sand removal and fine screening. From the cleaning stage 37, pulp 38b pulped from board, mixed waste paper and the REF-containing fraction is passed further to fractionation 54. Fractions 38a and 46

suitable for the manufacture of newsprint are passed from the fine screening 37 and from the fractionation 54 to deinking and bleaching stages 47, from which they are passed further to a newsprint machine 39a to serve as fibre raw material 48. A waste sludge 4 is produced at the deinking stage 47, which sludge is passed through the  
5 sludge press 41 to the gasification 32.

Fractions 49 suitable for the manufacture of board are passed from the fractionation 54 to a board machine 39b. The purpose of the cleaning, screening and fractionating stages 37,54 is to separate suitable fibre fractions 38a,46,49 for use in the manufac-  
10 ture of board 20b and newsprint 20a in an optimal manner. The potential of the raw material of fractions suitable for board can best be utilized if the board product is manufactured so as to have a layered structure.

Fractions 40 of poorer quality separated from pulp in the fine screening 37 and in  
15 the fractionation 54 are passed together with the reject 36 from the pulping station and a deinking sludge 4 to the sludge press 41, in which attempts are made to increase the dry matter of this material to as high a level as possible, preferably over 50 %. A material stream 42 thickened by means of the sludge press 41 is passed further to the gasifier 32.

20

Part of the gas 43 which is produced by the gasifier 32 and appropriately cleaned is passed directly to the paper machines 39a and 39b for use in the drying of newsprint and board, which may be accomplished, for example, as impingement drying.

25 The bulk of the gas 44 obtained from the gasifier 32 is passed to a power plant 45, which is thereby capable of generating in a profitable manner all the electrical energy 7 required by the system as well as a considerable amount of energy 8 for sale.

30 In summary of the examples of Figs. 2 and 3, it may be stated that the concepts described very efficiently utilize the material in the recycling stream, on the one hand, as fibre raw material in the manufacture of recycled products and, on the other

hand, as fuel in the production of energy. The concept is simultaneously clearly a net producer of energy. The raw material used both for the production of energy and for the manufacture of paper and/or board is very inexpensive in the concept.

- 5 Fig. 4 shows a production arrangement by means of which about 100,000 t/a of deinked market pulp 50 manufactured from waste paper and a considerable amount of energy 8 for sale, i.e. about 80 GWh/a of electricity and 280 GWh/a of district heat, are produced. The production plant uses as raw material about 80,000 t/a of office waste paper 10 and about 200,000 t/a of REF, i.e. sorted combustible waste.

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- The REF fraction is sorted as dry into two components, i.e. a fraction 31, which is rich in wood and which is passed directly to a gasifier 32, and a plastic- and paper-containing fraction 33, which is passed to a pulping station 34 in order to be processed together with the waste paper fraction 10. In connection with pulping, plastics and other impurities 36 are separated from the pulp.
- 15

- An accept 35 from the pulping station is passed further to cleaning stages 37, which include sand removal, fine screening and, when needed, fractionation. The purpose of these process stages is to separate fibre fractions 38 of the highest quality so as to be passed further to deinking and bleaching stages 47, from which pulp 51 is passed onwards to a drying machine 52.
- 20

- Fractions 40 of poorer quality separated from pulp in fine screening and fractionating 37 are passed together with a reject 36 generated in the pulping 34 and a deinking sludge 4 to a sludge press 41 in order to be thickened and from there a pulp stream 42 is passed further to the gasifier 32.
- 25

- Part of the product gas 43 which is obtained from the gasifier 32 and appropriately cleaned is passed directly for use in the drying 52 of pulp, which is advantageously accomplished as air drying.
- 30

## Amended Claims

1. A method of arranging the raw material, energy and waste management of a production plant manufacturing pulp and/or paper and/or board from recycled fibres, which  
5 plant receives and processes two separate streams (1,10) of waste material produced by a residential community, both of which are presorted and/or separately collected so that the first stream (1) of waste material mainly contains combustible waste to be used as fuel in the production of energy required by the production plant and the second stream (10) of waste material mainly contains waste paper and/or board to be used as fibre raw  
10 material of the production plant to a considerable extent, said second stream (10) being passed to a pulping stage (34), to a cleaning and screening stage (37) and to a fibre processing line comprising at least two of the stages (39,47,52,54) of fractionating, deinking, bleaching, pulp drying and papermaking, and rejects (36,40,4) from at least one of the fibre processing stages (34,37,47) are used as fuel in the production of energy,  
15 **characterized** in that the first stream (1) of waste material is first passed to a screening stage (30) in which a residual paper- and board-rich fraction (33) is separated from it to be passed to the pulping stage (34) where it is processed either together with the second stream (10) of waste material or separately from it to be used as fibre raw material in the manufacture of pulp, paper or board.
- 20
2. A method as claimed in claim 1, **characterized** in that waste fractions containing raw material and energy and produced as by-products in the production processes of the production plant, such as rejects and sludges (4,6,36,40) produced in the fibre processing stages, ash (9,9b) produced in the combustion of waste, and warm waste waters (17)  
25 are utilized within the production plant either as raw material or as energy to a considerable extent, or said fractions are separated such that they can at least principally be used in a further process or another type of useful use outside the production plant.
3. A method as claimed in claim 1 or 2, **characterized** in that wastes generated in the  
30 manufacture of pulp, paper and/or board, such as, a reject (36) separated in pulping (34),

a fibre fraction (40) of poor quality and a waste sludge (4) generated in deinking (47), are passed to the production of energy to serve as fuel.

4. A method as claimed in any one of claims 1 to 3, **characterized** in that the waste  
5 fractions (31,42) used as fuel are gasified and the thus obtained gas (44) is used in a coal, natural gas or oil fired power plant as secondary fuel.

5. A method as claimed in any one of claims 1 to 3, **characterized** in that the waste  
fractions (31,42) used as fuel are gasified and the thus obtained gas (44) is used as fuel  
10 in a gas turbine.

6. A method as claimed in claim 4 or 5, **characterized** in that combustible gas (43)  
produced by gasifying the waste fractions (31,42) is used for producing hot drying air for  
the hot-air drying of pulp, paper or board.

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7. A method as claimed in claim 6, **characterized** in that the drying of pulp, paper or  
board is accomplished solely as hot-air drying without any drying stages that require the  
use of steam.

8. A method as claimed in any one of the preceding claims, **characterized** in that ash  
20 (9) produced in the production (2) of energy is used as filler in the manufacture (5) of paper or board.

9. A method as claimed in claim 8, **characterized** in that the ash (9) used as filler in the  
25 manufacture of paper or board is produced by burning or by gasifying a sorted waste paper fraction in a separate combustion boiler or gasification reactor intended for this use.

10. A method as claimed in claim 8, **characterized** in that the ash (9) used as filler in  
30 the manufacture of paper or board is produced from ash from a combustion boiler or a gasification reactor by means of after-incineration or another bleaching process.

11. A method as claimed in claim 8, **characterized** in that the best quality fraction (9) of the ash produced in the production (2) of energy is used in the manufacture of paper or board and other ash fractions (9b) are utilized in other ways, for example, in connection with the manufacture of cement, earthwork, and the like.
- 5
12. A method as claimed in any one of the preceding claims, **characterized** in that ash produced in the production of energy is used on flue gas scrubbers of power plants for cleaning flue gases.
- 10
13. A method as claimed in any one of the preceding claims; **characterized** in that paper or board is manufactured by means of multi-layer web forming, in which connection pulp produced from different waste paper fractions is used for different layers of paper or board.
- 15
14. A method as claimed in any one of the preceding claims, **characterized** in that paper and/or board is/are manufactured on two or more manufacturing lines, using different types of waste paper fractions as fibre raw material.
15. A method as claimed in claim 14, **characterized** in that fibre waste and/or circulation water from one manufacturing line is/are passed to another manufacturing line.
- 20
16. A method as claimed in any one of the preceding claims, **characterized** in that at least part of the fresh water need of the production plant is taken from a waste water treatment plant (15) of the residential community as purified waste water (14), which is
- 25
- passed for use through a fresh water treatment system of the production plant.
17. A method as claimed in claim 16, **characterized** in that the waste waters are purified by distillation utilizing waste heats generated in the production of energy and the thus distilled water is used in the production processes to replace some of fresh
- 30
- water.

18. A method as claimed in claim 17, **characterized** in that distillation is used for purifying the production plant's own waste waters for recycling or for reducing the waste water load of the residential community.
- 5 19. A method as claimed in any one of the preceding claims, **characterized** in that waste waters (17) generated in the production plant are passed to the waste water treatment plant (15) of the residential community for purification.
- 10 20. A production plant for manufacturing of pulp and/or paper and/or board, which plant is arranged to use waste materials (1,10) as fibre raw material and as fuel and which plant comprises equipment for processing two presorted and/or separately collected streams (1,10) of waste material obtained from an adjacent residential community, the first stream (1) mainly containing combustible waste and the second stream (10) mainly containing waste paper and/or board, which equipment comprise devices (32,45) for utilizing the first stream (1) of waste material as fuel in the production of energy for at least the production plant's own requirements, devices (34,37) for pulping, cleaning and screening the second stream (10) of waste material as well as a fibre processing line comprising devices (39,47,52,54) for carrying out at least two of the processes of fractionating, deinking, bleaching, pulp drying and papermaking, **characterized** in that the devices for processing the first stream (1) of waste material further comprise a separating device (30) to which the first stream (1) of waste material is first passed for separating a paper- and board-rich fraction (33) from the combustible waste, said paper- and board-rich fraction (33) being passed to devices (34,37,47) for processing the second stream (10) of waste material to be used as fibre raw material.
- 15 25 21. A production plant as claimed in claim 20, **characterized** in that it comprises provisions for utilizing waste fractions (4,6,9,36,40) produced as by-products and containing raw material and energy or, alternatively, for passing such waste fractions (9b,17) to useful use outside the production plant, said waste fractions including e.g. rejects and sludges (4,6,36,40) from pulping, cleaning, screening, fractionating and/or
- 30



deinking devices, ash (9,9b) produced in the production of energy, and warm waste waters (17).

5 22. A production plant as claimed in claim 20, **characterized** in that the production plant comprises at least two paper or board manufacturing lines which are arranged to manufacture paper or board grades which are different from each other, in which connection different waste paper fractions can be utilized efficiently.

10 23. A production plant as claimed in any one of claims 20 to 22, **characterized** in that the equipment for the manufacture of paper and/or board include a paper or board machine provided with a multi-layer web former, owing to which different waste paper fractions can be efficiently utilized as raw materials in different layers of paper and/or board.

15 24. A production plant as claimed in any one of claims 20 to 22, **characterized** in that the energy production unit includes a gasification reactor (32), which is arranged to gasify combustible waste fractions (31,42) into product gases (44), which are arranged to be burnt in a combustion boiler or a gas turbine (45).

20 25. A production plant as claimed in claim 24, **characterized** in that the equipment for the manufacture of pulp and/or paper and/or board include hot-air drying devices, such as, infrared dryers, impingement dryers, airborne web-dryers or other equivalent devices, and they are arranged to use purified product gas (43) produced by the gasification reactor (32) for the generation of hot drying air.

25 26. A production plant as claimed in claim 25, **characterized** in that the drying of pulp, paper or board is accomplished solely by means of hot-air drying devices without any drying stages based on the use of steam.

27. A production plant as claimed in claim 20, **characterized** in that part of the ash produced as a by-product in the production (2) of energy is arranged to be used as filler (9) in paper or board in the papermaking process (5).

5 28. A production plant as claimed in claim 27, **characterized** in that the energy production unit includes a separate combustion boiler or gasification reactor, which is arranged to burn only a sorted waste paper fraction, the ash produced from said fraction being arranged to be passed to the papermaking process to serve as filler (9) in paper or board.

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29. A production plant as claimed in claim 27 or 28, **characterized** in that it comprises devices for after-incineration of the ash generated as a by-product in the production (2) of energy or for bleaching it in another way before it is used as filler (9) in paper or board.

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30. A production plant as claimed in claim 20, **characterized** in that it comprises devices for using purified waste water (14) derived from a waste water treatment plant (15) of the residential community as fresh water in the production processes.

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31. A production plant as claimed in claim 30, **characterized** in that it comprises devices for purifying waste or circulation waters by distillation utilizing the waste heat produced by the processes.

25

32. A production plant as claimed in any one of claims 20 to 31, **characterized** in that waste waters (17) from the production plant (50) are passed to the waste water treatment plant (15) of the residential community.

30

33. A production plant as claimed in claim 20, **characterized** in that a paper or board converting plant (19) is integrated into its immediate vicinity, which plant is capable of converting a considerable part of the paper and/or board output of the production plant (50).



## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>SK/FI982737</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/FI 99/ 01056</b>	International filing date (day/month/year) <b>17/12/1999</b>	(Earliest) Priority Date (day/month/year) <b>17/12/1998</b>
Applicant <b>VALMET CORPORATION et al.</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

**1. Basis of the report**

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

**4. With regard to the title,**

☐ the text is approved as submitted by the applicant.

☒ the text has been established by this Authority to read as follows:

**METHOD AND PRODUCTION PLANT FOR THE MANUFACTURE OF FIBROUS MATERIAL**

**5. With regard to the abstract,**

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

**6. The figure of the drawings to be published with the abstract is Figure No.**

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

1

☐ None of the figures.

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 99/01056

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B03B 9/06, D21B 1/02, C10B 53/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: B03B, C10B, D21B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2026019 A (BABCOCK KRAUSS-MAFFEI INDUSTRIEANLAGEN GMBH), 30 January 1980 (30.01.80), page 1, line 51 - line 88; page 2, line 28 - line 39, figures 1,2, abstract, claims	1-8,14,15, 21-28,35
Y	--	9-12,16-20, 29-34
X	GB 1364474 A (BLACK CLAWSON FIBRECLAIM, INC.), 21 August 1974 (21.08.74), page 8, line 104 - page 11, line 31, figures 1,5, claims	1-3,13,21-24
	--	

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search

3 April 2000

Date of mailing of the international search report

17. 05. 2000

Name and mailing address of the International Searching Authority  
 European Patent Office P.B. 5818 Patentlaan 2  
 NL-2280 HV Rijswijk  
 Tel(+31-70)340-2040, Tx 31 651 epo nl.  
 Fax(+31-70)340-3016

Authorized officer

ULF NYSTRÖM/ELY

Telephone No.

## INTERNATIONAL SEARCH REPORT

Information on patent family members

02/12/99

International application No.

PCT/FI 99/01056

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2026019 A	30/01/80	DE 2823505 A,C DK 220579 A ES 480702 A IT 1124094 B IT 7912621 D JP 54158759 A SE 7904634 A	06/12/79 01/12/79 16/11/79 07/05/86 00/00/00 14/12/79 01/12/79
GB 1364474 A	21/08/74	CA 950861 A DE 2108829 A FR 2080786 A,B JP 51002963 B US 3830636 A ZA 7100925 A CA 933114 A DE 69408328 D,T EP 0715643 A,B FI 54936 B,C JP 9501968 T SE 384632 B,C US 3736223 A	09/07/74 16/12/71 19/11/71 30/01/76 20/08/74 26/04/72 04/09/73 03/09/98 12/06/96 29/12/78 25/02/97 17/05/76 29/05/73
US 3765921 A	16/10/73	NONE	
WO 9512549 A1	11/05/95	AU 678081 B AU 1036895 A CA 2171838 A EP 0726879 A FI 961883 A JP 9504473 T SE 502916 C SE 9303645 A	15/05/97 23/05/95 11/05/95 21/08/96 03/05/96 06/05/97 19/02/96 06/05/95

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 99/01056

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 3765921 A (VICTOR PUSKAR), 16 October 1973 (16.10.73), column 1, line 54 - column 2, line 44, abstract  --	9-12,29-31
Y	WO 9512549 A1 (SUNDS DEFIBRATOR INDUSTRIES AB), 11 May 1995 (11.05.95), figure 1, claims 1-4, abstract  -- -----	16-20,32-34

SA '63194

## INTERNATIONAL SEARCH REPORT

Information on patent family members

02/12/99

International application No.

PCT/FI 99/01056

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2026019 A	30/01/80	DE 2823505 A,C	06/12/79
		DK 220579 A	01/12/79
		ES 480702 A	16/11/79
		IT 1124094 B	07/05/86
		IT 7912621 D	00/00/00
		JP 54158759 A	14/12/79
		SE 7904634 A	01/12/79
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		DE 2108829 A	16/12/71
		FR 2080786 A,B	19/11/71
		JP 51002963 B	30/01/76
		US 3830636 A	20/08/74
		ZA 7100925 A	26/04/72
		CA 933114 A	04/09/73
		DE 69408328 D,T	03/09/98
		EP 0715643 A,B	12/06/96
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		JP 9501968 T	25/02/97
		SE 384632 B,C	17/05/76
		US 3736223 A	29/05/73
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		CA 2171838 A	11/05/95
		EP 0726879 A	21/08/96
		FI 961883 A	03/05/96
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		SE 502916 C	19/02/96
		SE 9303645 A	06/05/95



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 99/01056

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 3765921 A (VICTOR PUSKAR), 16 October 1973 (16.10.73), column 1, line 54 - column 2, line 44, abstract  --	9-12,29-31
Y	WO 9512549 A1 (SUNDS DEFIBRATOR INDUSTRIES AB), 11 May 1995 (11.05.95), figure 1, claims 1-4, abstract  -- -----	16-20,32-34